Pollution Prevention Fact Sheet
Medical Facilities

Utah Department of Environmental Quality

Promoting a Healthy Environment

Medical facilities, including hospitals, nursing homes, clinics, physician's offices, dental offices, emergency and ambulance services, hospices, laboratories, veterinary clinics, agricultural and animal care operations, medical/nursing schools, and specialty care centers may generate hazardous materials. These wastes are unique in several ways. There is a large variety of wastes but the volumes are small relative to industrial facilities. These medical facilities employ toxic chemicals and hazardous materials for numerous diagnostic and treatment purposes. The hazardous materials include:

- Chemotherapy and antineoplastic chemicals
- Formaldehyde
- Photographic chemicals
- Radio nuclides
- Solvents
- Mercury
- Waste Anesthetic gases
- Other toxic, corrosive, and miscellaneous chemicals.

In addition to hazardous and solid wastes some of these facilities generate infectious wastes. These wastes are identified as any solid waste that contains or may reasonably be expected to contain pathogens of sufficient virulence and quantity that exposure to the waste by a susceptible host could result in an infectious disease. Infectious waste is also commonly referred to as "Red Bag" waste. In general these materials are not considered hazardous and are treated as solid wastes. For more information concerning infectious wastes contact the Solid Waste Section in the Division of Solid and Hazardous at
1-800-538-6170.

Chemotherapy and Antineoplastic Chemicals

Antineoplastic, or cytotoxic, agents that are used to produce chemotherapy solutions are generally handled through a central clinic or pharmacy and in most facilities less than a months supply are kept on hand. Chemotherapy accounts for the largest volume of hazardous materials produced in medical facilities. Only a small percentage of these wastes contain concentrated amounts of chemotherapy compounds. Most of the waste volume is associated with lightly contaminated items such as personal protective clothing and gauze pads. The following methods are used to prevent or minimize these wastes:

- Reduce volumes used or stored

- Optimize drug container size
- Return outdated drugs to manufacture
- Centralize chemotherapy compounding location.
- Minimize waste from compounding hood cleaning
- Provide spill cleanup kits
- Segregate wastes

Formaldehyde

Formaldehyde is used in pathology, autopsy, dialysis, embalming, and nursing units. Occupational exposure to airborne concentrations of formaldehyde is regulated by OSHA.
Formaldehyde also represents a significant source of hazardous materials in medical facilities. In dialysis, the formalin is diluted to 4 percent, and used to disinfect the membranes in the machine and the effluent is stored for disposal. Formaldehyde is also used to preserve specimens.
Pollution prevention and waste minimization suggestions:

- Minimize strength of formaldehyde solutions
- Minimize waste from cleaning of dialysis machines
- Use reverse osmosis water treatment to reduce or possibly eliminate dialysis cleaning demands
- Capture waste formaldehyde
- Practice recycling and reuse of formaldehyde in pathology and autopsy laboratories

Photographic Chemicals

Photographic developing solutions used in x-ray departments consist of two parts, a fixer and a developer. Hazardous chemicals in these solutions include hydroquinone, potassium hydroxide, silver, glutaraldehyde and acetic acid. Traditionally, silver containing effluent from the fixer solution is treated to recover this precious metal, while the remaining aqueous waste has been discharged to the sewer. Discharging these hazardous materials to the sewer is subject to regulation and is generally an undesirable management practice, even if sanitation authorities allow such disposal.
Pollution prevention and waste minimization suggestions:

- Return off-specification developer to manufactures
- Cover developer and fixer tanks to reduce evaporation and oxidation of the solution
- Use “Best Available Technology” to recover silver efficiently
- Recycle waste film and paper
- Use squeegees to reduce bath losses
- Use counter current washing

Radio nuclides

Radioactive wastes are generated in nuclear medicine and clinical testing laboratories. In most facilities the radioactive materials are either kept on site until they decay to nonhazardous levels or stored for disposal.

Pollution prevention and waste minimization suggestions:

- Use less hazardous isotopes whenever possible
- Segregate and properly label radioactive wastes, and store short lived radioactive wastes in isolation on site until decay permits disposal as a solid waste.

Solvents

Solvent wastes are typically generated in various departments in medical facilities. These include pathology, histology, engineering, embalming, and laboratories. Generally, volumes of solvent are small in medical facilities. Among the solvents often found are ethanol, xylene, acetone, methanol, toluene, isopropanol and the halogenated compounds such as methylene chloride, chloroform, Freon, trichloroethylene and trichloromethane.
Pollution prevention and waste minimization suggestions:

- Substitute less hazardous cleaning agents
- Use pre-mixed test kits involving solvent fixation
- Segregate solvent waste
- Recover/reuse solvents through distillation (including the use of commercial solvent recyclers)

Mercury

The primary sources of mercury waste in medical facilities include broken or obsolete equipment. Mercury wastes are decreasing due to the substitution of solid state electronic sensing instruments for those containing mercury.
Pollution prevention and waste minimization suggestions:

- Substitute electronic sensing devices for mercury containing devices
- Provide mercury spill cleanup kits and train personnel
- Recycle uncontaminated mercury wastes using proper safety controls.
  (There are not commercial recyclers of mercury in Utah)

Anesthetic Gases

Nitrous oxide and the halogenated agents halothane (Flurothane), enflurane (Ethrane), isoflurane (Forane), and other substances are used as inhalation anesthetics. Exposure of medical personnel to these substances should be minimized due to the possible acute toxic effects.
Pollution prevention and waste minimization suggestions:

- Employ low leakage work practices
- Purchase low leakage equipment
- Stringent maintenance program to avoid leaks in equipment and containers.

Toxics, Corrosives, and Miscellaneous Chemicals

Poisons, oxidizers, and caustics are used at most medical facilities, generally in small quantities. These materials include such things as ethylene oxide, which is used as a sterilizer, utility wastes, such as boiler blowdown, and maintenance waste which includes such things as waste lube oils, cleaning solvents, vacuum pump oils and janitorial supplies.

Pollution prevention and waste minimization suggestions:

- Inspection and proper equipment maintenance for ethylene oxide sterilizers
- Substitute less toxic compounds and cleaning agents
- Return containers for reuse or recycling
- Neutralize acid waste with basic waste
- Use automated systems for laundry chemicals

For More Information, Contact:

Division of Solid & Hazardous Waste (801) 538-6170.
Environmental Hotline (800) 458-0145.
Pollution Prevention Coordinator (801) 536-4477.

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